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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/842,483	04/25/2001	Guohua Li	09792909-5001	7927

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EXAMINER

RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 06/23/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/842,483

Applicant(s)

LI ET AL.

Examiner

Mark Ruthkosky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5,7,9,11,13 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 3 and 7 is/are allowed.
- 6) ☐ Claim(s) 1,5,9,11,13 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4/25/2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Claim Objections

Claims 1, 3, 5, 7, 9, 11, 13 and 15 are objected to because of the following informalities. In the formulae of the claims, the value of x is shown to range from $0 < x \leq 2$. In the applicant's amendment, the \leq sign is missing between the x and the 2 in all of the claims. The omission is considered a typographical error and should be corrected in the applicant's response. The claims have been treated in their original format with regard to the omission of the sign. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The rejection of claims 1, 3, 5, 7, 9, 11, 13 and 15 under 35 U.S.C. 102(b) as being anticipated by Goodenough et al. (US 5,910,382) has been overcome by the applicant's amendment.

The rejection of claims 1, 3, 5, 7, 9, 11, 13 and 15 under 35 U.S.C. 102(e) as being anticipated by Honbo et al. (US 6,458,488) has been overcome by the applicant's amendment.

The rejection of claims 1, 3, 5, 7, 9, 11, 13 and 15 under 35 U.S.C. 102(b) as being anticipated by Kariru (JP 11-025983) has been overcome by the applicant's amendment.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5, 9, 11, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodenough et al. (US 5,910,382) in view of Iwata et al. (US 5,807,646.)

Goodenough et al. (US 5,910,382) teaches a cathode material for lithium secondary batteries comprising LiMPO_4 , where M is Mn, Fe, Co, Ti, and Ni. Examples of structures include $\text{LiMn}_x\text{Fe}_{1-x}\text{PO}_4$, and $\text{LiTi}_x\text{Fe}_{1-x}\text{PO}_4$ wherein X is between 0 and 1 (see col. 2 and claims 1-9.) The combinations of metals read on the structures of the instant claims.

Goodenough et al. (US 5,910,382) is silent to the grain size and specific surface area of the material and therefore does not teach a lithium transition metal phosphate cathode material with a grain size not large than $10\text{ }\mu\text{m}$ and a Bulnauer Emmet Taylor specific surface area of not less than $0.5\text{ m}^2/\text{g}$. Iwata et al. (US 5,807,646), however, teaches a lithium manganese oxide cathode material with a grain size not large than $10\text{ }\mu\text{m}$ and a surface area of not less than $0.5\text{ m}^2/\text{g}$ (see the claims.) The material is used as a cathode in a lithium secondary battery. It would be obvious to one of ordinary skill in the art at the time the invention was made to prepare a lithium transition metal active material for a cathode with a grain size not larger than $10\text{ }\mu\text{m}$ and a surface area of not less than $0.5\text{ m}^2/\text{g}$ as the material will provide beneficial effects with regard to capacity as taught in the reference. If the material has a surface area of less than $0.5\text{ m}^2/\text{g}$, the material tends to work at a decrease rate of utilization and show a low charge/discharge capacity. If the active material for the electrode has a grain size larger than $10\text{ }\mu\text{m}$, the electrode shows a low charge/discharge capacity, (as shown in col. 4, lines 30+.) One of ordinary skill in the art

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would recognize from these teachings that it is preferable to prepare a lithium electrode with a grain size not larger than $10\ \mu\text{m}$ and a surface area of not less than $0.5\ \text{m}^2/\text{g}$.

Allowable Subject Matter

Claims 3 and 7 are allowed.

The following is an examiner's statement of reasons for allowance:

The instant claims are to a non-aqueous cell and a positive electrode active material for lithium secondary batteries comprising lithium transition metal phosphate structures such as $\text{Li}_x\text{Mn}_y\text{Fe}_z\text{A}_{1-(y+z)}\text{PO}_4$, where A is selected from Ti or Ag. A portion of the material has a grain size not larger than $10\ \mu\text{m}$ and has a BET surface area of not less than $0.5\ \text{m}^2/\text{g}$. The prior art does not teach a positive electrode active material comprising $\text{Li}_x\text{Mn}_y\text{Fe}_z\text{A}_{1-(y+z)}\text{PO}_4$, where A is selected from Ti or Ag with a portion of the material has a grain size not larger than $10\ \mu\text{m}$ and has a BET surface area of not less than $0.5\ \text{m}^2/\text{g}$.

The most pertinent prior art includes Goodenough et al. (US 5,910,382), which teaches a cathode material for lithium secondary batteries comprising LiMPO_4 , where M is Mn, Fe, Co, Ti, and Ni. Examples of mixed metal structures include $\text{LiMn}_x\text{Fe}_{1-x}\text{PO}_4$, and $\text{LiTi}_x\text{Fe}_{1-x}\text{PO}_4$ wherein X is between 0 and 1 (see col. 2 and claims 1-9.) Honbo et al. (US 6,458,488) teaches a cathode material for lithium secondary batteries comprising $\text{Li}_{x+a}\text{Mn}_{2-a+b}\text{M}_b\text{PO}_4$, where M is Cu, Fe, Co, Cr, or Ni. In addition, Kariru (JP 11-025983) teaches a cathode material for lithium secondary batteries comprising $\text{LiM}_{1-x}\text{Me}_x\text{PO}_4$, where M is Mn, Co, Ni and Me is Mg, Fe, Ni, Co, Mn, Zn, Ge, Cu or Cr. Battery components are discussed throughout the references. The prior art does not teach a positive electrode active material comprising $\text{Li}_x\text{Mn}_y\text{Fe}_z\text{A}_{1-(y+z)}\text{PO}_4$, where $0 < x \leq 2$,

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$0.5 < y, 0.95$, $0.5 < y+z < 1$ and where A is selected from Ti or Ag with a portion of the material has a grain size not larger than $10\ \mu\text{m}$ and has a BET surface area of not less than $0.5\ \text{m}^2/\text{g}$ and, therefore, the claims are allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 4/22/2003 have been fully considered but they are not persuasive. The rejection of claims 1, 3, 5, 7, 9, 11, 13 and 15 under 35 U.S.C. 102(b) have been overcome by the applicant's amendment.

The applicant's arguments to the rejections under 35 U.S.C. 103 state that the supporting reference, Iwata et al. does not teach an electrode material of LiMPO_4 , where M is Mn, Fe, Co, Ti, Ni and combinations thereof.

Goodenough et al. (US 5,910,382) teaches a cathode material for lithium secondary batteries comprising LiMPO_4 , where M is Mn, Fe, Co, Ti, Ni and combinations thereof. Goodenough et al. (US 5,910,382) does not teach a cathode material with a grain size not large than $10\ \mu\text{m}$ and a Bulnauer Emmet Taylor specific surface area of not less than $0.5\ \text{m}^2/\text{g}$.

Iwata et al. (US 5,807,646) is relied upon to show that the prior art teaches lithium transition metal oxide positive active materials with a grain size not large than $10\ \mu\text{m}$ and a surface area of not less than $0.5\ \text{m}^2/\text{g}$ and that it would be obvious to one of ordinary skill in the

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art at the time the invention was made to prepare a lithium transition metal oxide active material for an positive electrode with a grain size not larger than 10 μm and a surface area of not less than 0.5 m^2/g . One of ordinary skill in the art would recognize the effects of changing the size of the active material. For example, if the material is less than 0.5 m^2/g , the material tends to work at a decreased rate of utilization and shows a low charge/discharge capacity. If the active material for the electrode has a grain size larger than 10 μm , the electrode shows a low charge/discharge capacity, (as shown in col. 4, lines 30+.) One of ordinary skill in the art would recognize from these teachings that it is preferable to prepare a lithium electrode with a lithium transition metal active material with a grain size not larger than 10 μm and a surface area of not less than 0.5 m^2/g .

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Examiner Correspondence

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1193. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 703-305-0587. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:00.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 703-308-2383.

The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Mark Ruthkosky

Patent Examiner

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Mark Ruthkosky
6/18/03